



USER MANUAL

AX2010P

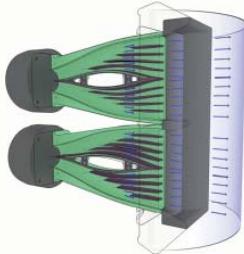
passive vertical array loudspeaker

KEY FEATURES

- High output line array element
- Compact size, very good output-to-weight ratio
- High quality, low compression, low distortion HF driver
- Very stable horizontal coverage
- Transmission Line back loading for clean mid-bass reproduction
- Natural sound Transmission Line HF projection wave-forming device

INTRODUCTION

The AX2010P Vertical Line Array element is designed for a wide range of sound reinforcement applications where a flexible and easy to use vertical array systems is needed. The AX2010P has been designed both for rental live sound applications and for fixed installations and has been engineered for the simplest use possible but without sacrificing anything in sound quality and performance.

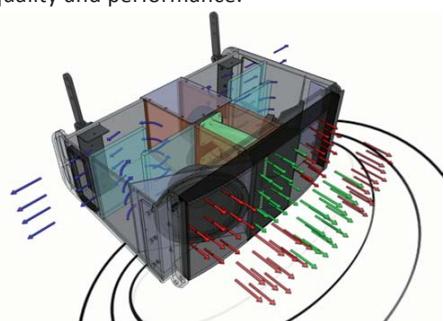


The high frequency range is reproduced by two low-distortion compression drivers, equipped with very light-weight diaphragms. Two transmission line waveforming waveguides have been used to load the HF drivers, in order to provide a detailed and natural sound and to achieve a long-distance HF projecting capacity.

The two 10" woofers employed in the reproduction of the mid-bass range are equipped with very light-weight cones. The lightness of the diaphragm is furthermore improved by the use of aluminium voice coil instead of conventional copper. This ensure a fast reproduction of the mid range and of mid-bass musical passages, improving also the thermal

capacity of the voice coil and, consequently, controlling the overall power compression. The two 10" woofers are back loaded by a short hybrid transmission line that minimizes the effect of the box resonances and eliminates the "boxy" mid-bass sound commonly obtained from regular bassreflex enclosures.

The crossover filter approach is based on a "Constant Power" technique. Thanks to a particular phase combination between the two ways around the crossover frequency, this approach is able to provide a very stable horizontal coverage and a very stable off-axis sound image, also minimizing unwanted effects around the crossover frequency. The further application of phase linearization techniques, combined to constant power crossover, yield a linear phase response and a coherent time response. This allows for a natural perception of acoustic instruments and voices and for an improved depth of the sound image.



TECHNICAL SPECIFICATION

Acoustical

System type	Line Array Element Short Transmission Line LF Back Loading Acoustic Transmission Line HF Waveguide
Low frequency transducer	Two 10" (260 mm), 2.5" (64 mm) aluminium voice coil, 16Ω each, paralleled
High frequency transducer	Two 1.4" drivers, 2.5" (64 mm) edgewound voice coil, titanium diaphragm, 16Ω each, paralleled
Frequency response (± 3 dB)	75 Hz – 18 kHz (Processed)
Sensitivity (2.83 V @ 1m, 2 Pi)	99 dB SPL (LF); 108 dB SPL (HF)
Horizontal Coverage Angle	110° (-6 dB)
Vertical Coverage Angle	10° (-6 dB)
Maximum Peak SPL @ 1m	130 dB
Electrical	
Nominal Impedance	8Ω (LF) + 8Ω (HF)
Power Handling Continuous*	700 W (LF) + 150 W (HF)
Power Handling Peak	1400 W (LF) + 300 W (HF)
LF Power Compression	@ -10 dB Power (70 W) = 0.5 dB @ -3 dB Power (350 W) = 1.5 dB @ 0 dB Power (700 W) = 3.2 dB

Connectors

Connector Type	Neutrik® Speakon® NL4 x 2
Input Wiring	LF = Pin 1+/1-; HF = Pin 2+/2-

Mechanical

Width	746 mm (29.37")
Height	341 mm (13.42")
Depth	530 mm (20.86")
Taper angle	5°
Construction	15 mm, reinforced Phenolic Birch
Paint	High resistance, water based paint

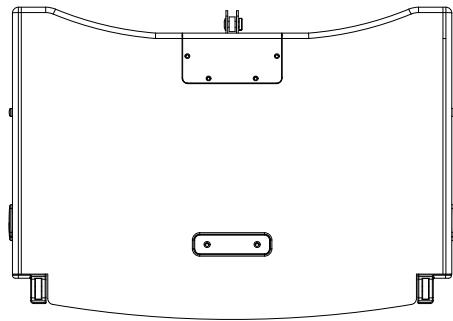
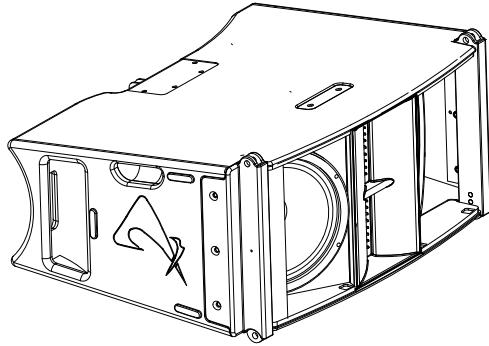
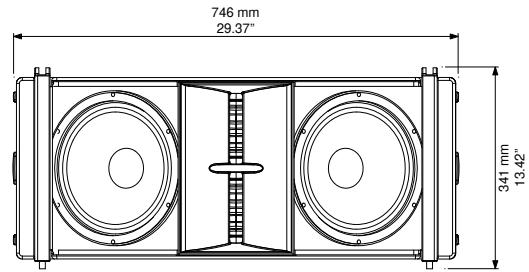
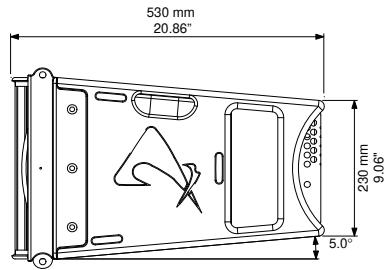
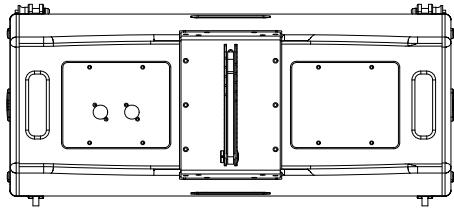
Suspension system

Front Suspension	Aluminium Fast Link structure with $\frac{1}{4}$ Fast Pin
Back Suspension	High Strength Steel with $\frac{1}{4}$ Fast Pin
Net Weight	39.9 Kg (87.96 lbs.)

* AES Pink Noise Power



MECHANICAL DRAWING



OPTIONAL ACCESSORIES

AXCASE02	Carrying Case for 2 box unit
NL4FX	Neutrik Speakon® PLUG
PC260	2 in 6 out digital loudspeaker processor
USB2CAN	PRONET network converter
RAINCOV2010	Rain protection for connectors
KPTAX2012P	Fly bar for Axiom AX2010 Loudspeakers
BOARDAC2P	M10 foot for stacked installation

see www.proel.com for detailed description and other available accessories.

SPARE PARTS

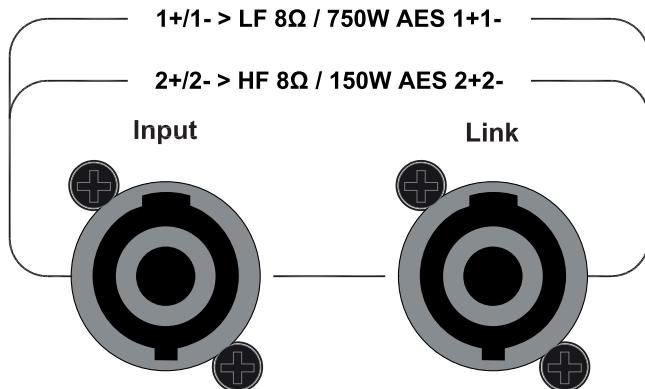
NL4MP	Neutrik Speakon® panel socket
95AXM014	Locking Pin for AX2010
PLG716	Straight Shackle 16 mm for Fly bar
91CRAIN3	Crossover/protection module
98AXM10WZ8	10" woofer - 2.5" VC
98DRI1424	1.4" - 2.5" compression driver
98MBN1424	titanium diaphragm for 1.4" driver



REAR PANEL

INPUT - Power input for the external amplifier. The AX2010P does not include a passive crossover for filtering the signal, but only an internal protection that applies a gentle high-pass filtering and a limitation for excessive power on the HF section. The connections are the following:

INPUT - LINK	
NL4 pin number	internal connection
1+	LF+
1-	LF-
2+	HF+
2-	HF-



LINK - Power output in parallel with the INPUT socket for connecting the unit to another speaker. The number of AX2010P cabinets that can be connected in parallel depends on the amplifier load capacity.



AIMING and SUSPENDING INSTRUCTIONS

PREDICTION: EASE Focus 1

To aim correctly a complete system PROEL suggests to use always the Aiming Software - **EASE Focus 1**:

The **EASE Focus 1 Aiming Software** is a two-dimensional, acoustic simulation software that serves for the configuration and modelling of Line Arrays close to reality. It only considers the direct field, created by the complex addition of the sound contributions of the individual loudspeakers or array components.

The design of EASE Focus is targeted at the end user. It allows the easy and quick prediction of the array performance in a given venue. The scientific base of EASE Focus stems from EASE, the professional electro- and room acoustic simulation software developed by AFMG Technologies GmbH. It is based on the EASE Focus 1 system definition files (**Proel_AXIOM_AX2010P.EFO**) required for its use. The EFO file contains the data that defines the Line Array with regard to its possible configurations as well as to its geometrical and acoustical properties. For detailed explanation of how to use the software and how to obtain a correct aiming refer to EASE Focus documentation and other on-line manuals (http://focus.afmg.eu/index.php/Focus_1.html).



WARNING! CAREFULLY READ THE FOLLOWING INSTRUCTIONS AND CONDITION OF USE:



- This loudspeaker is designed exclusively for Professional audio applications. **The product must be installed by qualified personal only.**
- Proel strongly recommends that this loudspeaker cabinet be suspended taking into consideration all current National, Federal, State and Local regulations. Please contact the manufacturer for further information.
- Proel do not accept any liability for damage caused to third parties due to improper installation, lack of maintenance, tampering or improper use of this product, including disregard of acceptable and applicable safety standards.
- During assembly pay attention to the possible risk of crushing. Wear suitable protective clothing. Observe all instructions given on the rigging components and the loudspeaker cabinets. When chain hoists are in operation ensure that there is nobody directly underneath or in the vicinity of the load. Do not under any circumstances climb on the array.

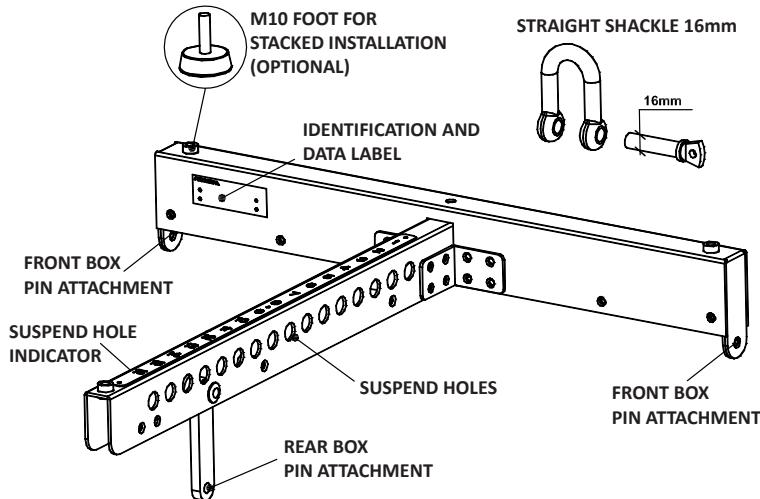
KPTAX2012P Fly Bar and accessories

The AX2010 Systems are built to allow the suspension of array with variable shape and dimensions. Thanks to a suspension mechanism designed to be functional, flexible and safe, each system must be suspended or stacked using the **KPTAX2012P** fly bar. The loudspeakers are linked together in a column using a series of couplers integrated in the frame of each enclosure. Each system is set up properly both acoustically and mechanically only using the aiming software.

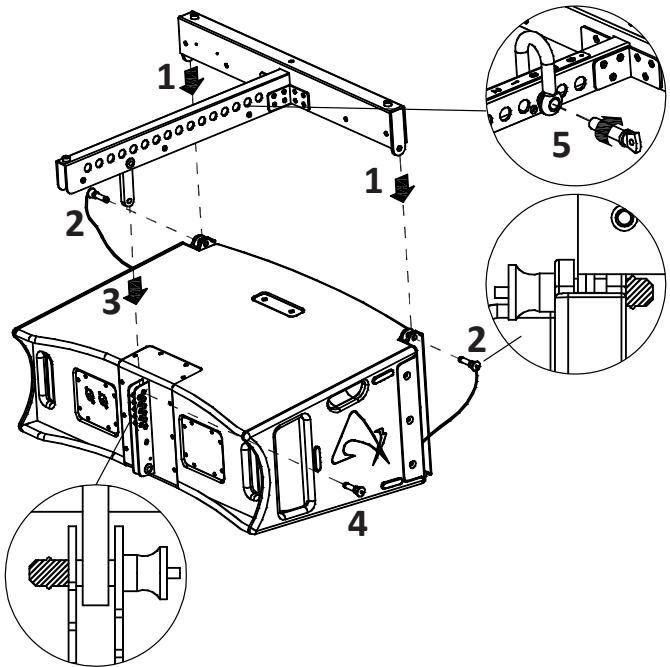
Coupling system in the front does not require any adjustment: using two locking pins, each loudspeaker box is fixed to the previous. The slotted bar in the back is inserted in a U-shaped frame which features a series of numbered holes. Sliding the slotted bar in the U-shaped frame of the next loudspeaker and inserting a locking pin in one of the numbered holes, it is possible to adjust the relative splay angle between two adjacent loudspeakers in the array column.

KPTAX2012P fly bar maximum capacity is 700 Kg (1540 lbs) with the 0° angle. It can support up to 12 AX2010 loudspeakers with a safety factor of 7:1.

KPTAX2012P FLY BAR AND ACCESSORIES



KPTAX2012P FLY BAR ASSEMBLY SEQUENCE



Follow the sequence in the figure for fixing the fly bar at the first box. Usually this is the first step before lifting up the system. Be careful to insert properly all the locking pins (2)(3) and the shackle (5) in the right holes as specified by the aiming software.

When lifting the system always proceed gradually step by step, paying attention to secure the fly bar to the box (and the box to the other boxes)

before pulling up the system: this makes easier to insert properly the locking pins. Also when the system is released down, unlock gradually the pins.

During the lifting be very careful to not let the cables enter the space between one enclosure and the other, as their compression could cut them.

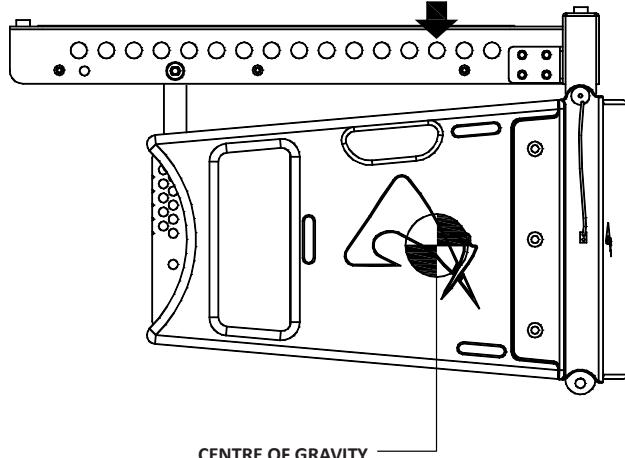




Fly bar suspension and angle setup (centre of gravity)

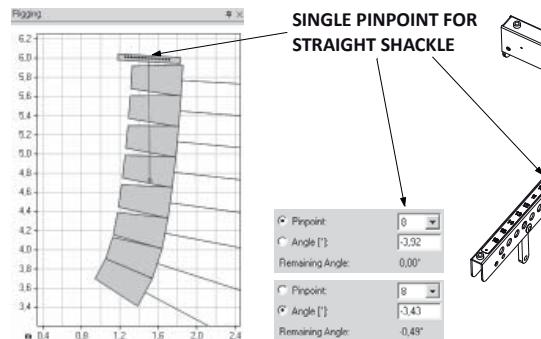
The first figure shows where the normal centre of gravity is with one box or several boxes arranged in a line. Usually the boxes are arranged to make an arc for the best coverage of the audience, so the center of gravity moves backward. The aiming software suggests the ideal suspension pinpoint taking into account this behaviour: fix the straight shackle in this position.

KPTAX2012P FLY BAR FOR FLOWN ARRAY



CENTRE OF GRAVITY

KPTAX2012P FLOWN PINPOINT



Note that the ideal aiming angle often doesn't correspond to the pinpoint: there is often a little difference between ideal aiming and real aiming and its value is the remaining angle: positive remaining angle can be adjusted a little using two ropes, negative remaining angle are self adjusted a little because the cables weighs on the back of the array. With some experience it's possible to consider preventively these required little adjustments.

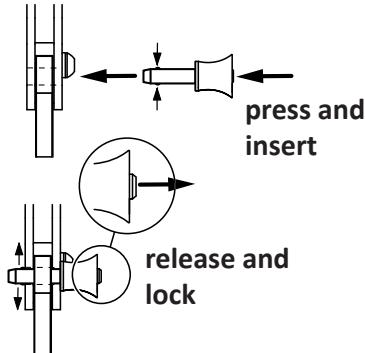
During the flown set up you can connect the elements of the array to their cables.

We suggest to discharge the weight of the cables from the flying pinpoint by tying them with a textile fibre rope, instead of letting them hang freely: in this way the position of the array will be much more similar to the simulation produced by the software.

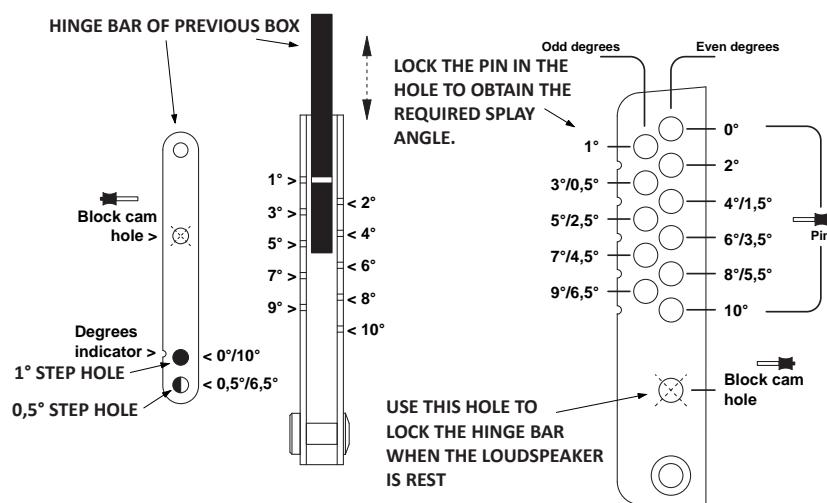
Pin locking and splay angles set up

The figure below shows how to insert correctly the locking pin and how to set up the splay angle between loudspeakers.

95AXM014 LOCKING PIN



LOUDSPEAKER SPLAY ANGLES SET UP



Wind loads

When planning an open-air event it is essential to obtain current weather and wind information. When loudspeaker arrays are flown in an open-air environment, possible wind effects must be taken into account. Wind load produces additional dynamic forces acting on the rigging components and the suspension, which may lead to a dangerous situation. If according to the forecast wind forces higher than 5 bft (29-38 Km/h) are possible, the following actions have to be taken:

- The actual on-site wind speed has to be monitored permanently. Be aware that wind speed typically increases with height above ground.
- Suspension and securing points of the array should be designed to support double the static load in order to withstand any additional dynamic forces.



WARNING!

Flying loudspeakers overhead at wind forces higher than 6 bft (39-49 Km/h) is not recommended. If the wind force exceeds 7 bft (50-61 Km/h) there is a risk of mechanical damage to the components which may lead to a dangerous situation for persons in the vicinity of the flown array.

- Stop the event and make sure that no person remains in the vicinity of the array.
- Lower and secure the array.



Stacked installation



WARNING!

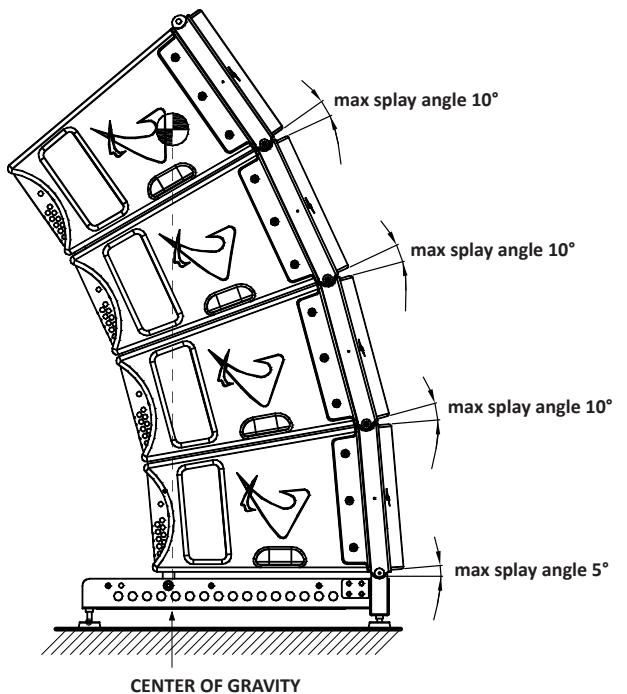
- The ground where the KPTAX2012P Fly bar serving as ground support is placed needs to be absolutely stable and compact.
- Adjust the feet so to lie the bar perfectly horizontal.
- Always secure ground stacked setups against movement and possible tipping over.
- A maximum of 4 x AX2010 cabinets with the KPTAX2012P Fly bar serving as ground support are allowed to be set up as ground stack.

In the stack configuration you have to use the three optional BOARDAC2P feet and the fly bar must be mounted upside down on the ground.

Coupling system in the front do not require any adjustment: using two locking pins each loudspeaker box is fixed to the previous. The slotted bar in the back is inserted in a U-shaped frame which features a series of numbered holes. Sliding the slotted bar in the U-shaped frame of the next loudspeaker and inserting a locking pin in one of the numbered holes, it is possible to adjust the relative splay angle between two adjacent loudspeakers in the array column.

The optimal splay angles can be simulated using the EASE Focus 1 software.

KPTAX2012P STACKED ARRAY



System Processing basic instruction

The AX2012P system do not feature passive filters and, to work, it needs an external processor to take care of crossover filtering, temporal alignment and protection of all devices. Proel provides PC260 digital processor which comes with the basic preset for the AX2010. The optimization of vertical array systems through digital processing is based on data obtained through measurements of the polar response throughout space and on their elaboration through purpose-designed mathematical models. For detailed instructions about PC260 refer to its proper manual.

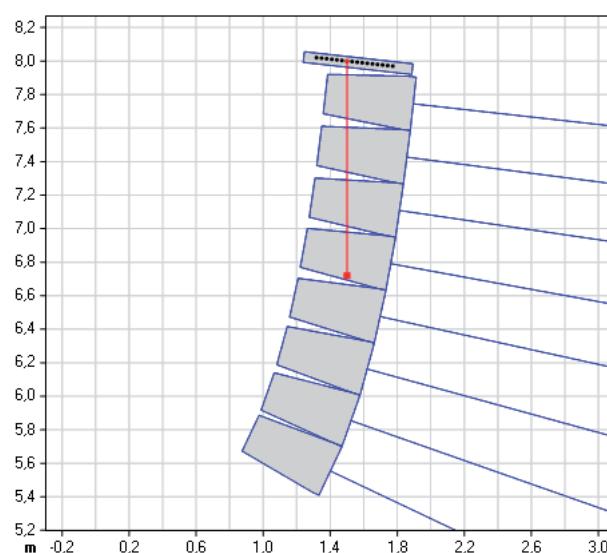
PC260 PRESET: 2-F-2010-4T1S_02

The preset provided for the AX2012P allow the correct operation of the system, provide the best starting point for setup of temporal alignment, gain adjustment and, eventually, system equalization.

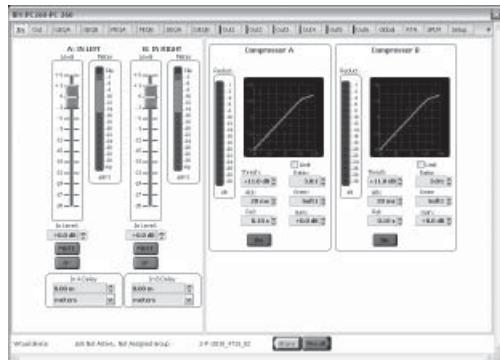
The preset is made considering 8xAX2010P and 2xSW218P for each column in flown configuration, this configuration is a typical application of AX2010P vertical array so for the flown array arrangement was considered similar to the following:

NOTE: The subwoofers SW218P was placed underneath the flown array.

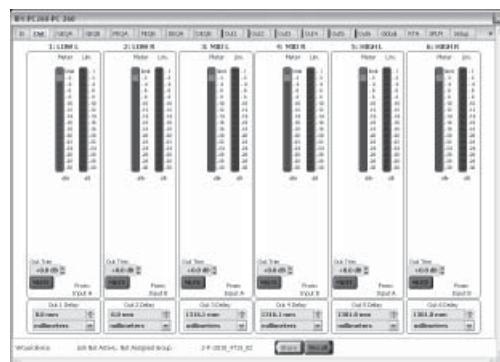
System Details				
Company:	PROEL			
System Setup:	Axiom_AX2010P			
Pick Point:	X=1,50 m Y=8,00 m			
Cradle Angle:	-6,35°			
Pin Point:	10 (Remaining Angle=0,00°)			
Frame Weight:	8,30 kg ("KPTAX201P")			
Box Weight:	319,20 kg ("AX2010P")			
Total Weight:	327,50 kg			
Height:	2,65 m			
Rigging Details				
Nr.	Box	Gain	Angle	Total
Frame	KPTAX201P			-6,35
1	AX2010P	0 dB	0	-6,35°
2	AX2010P	0 dB	1	-7,35°
3	AX2010P	0 dB	1	-8,35°
4	AX2010P	0 dB	2	-10,35°
5	AX2010P	0 dB	2	-12,35°
6	AX2010P	0 dB	3	-15,35°
7	AX2010P	0 dB	4	-19,35°
8	AX2010P	0 dB	6	-25,35°



In the "2-F-2010-4T1S_02" PC260 preset some parameters can be customized and some other are protected, this ensure a safe operation of the system. In the next page follows a brief description of customizable parameters:



IN: In this screen you can adjust the input levels and the input compressors. The input range can be optimized in the -30 ÷ +6 dB range. The level is set after the AD conversion, so if you have problems with an excessive input signal use the analog PAD button on the PC260 back panel. The compressors are set in order to attenuate very high input signals (the threshold is +11 dB), ensuring a more transparent musical behaviour of the system limiting. If needed, the compressor threshold can be freely adjusted.



OUT: in this page you can see the level of the output signals and the gain reduction if the limiters are activated. You can also trim (± 6 dB) the output signals in order to adjust the balance of LF, MF and HF ranges.



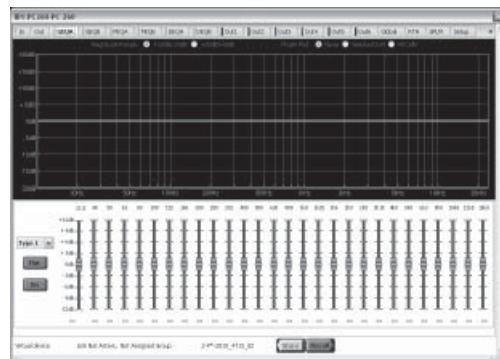
WARNING! The limiter setting of PC260 and 2-F-2010-4T1S_02 preset is set for the use of **32 dB fixed gain power amplifiers**: contact PROEL if you need a different setting.

The delays are set for the optimal alignment of a standard flown configuration with the vertical array on top of the subwoofers.

If needed, the delay of the subwoofers (LOW-L and LOW) can be adjusted in relation to the MID-HIGH outputs for the optimal alignment when the system is installed in a different position.



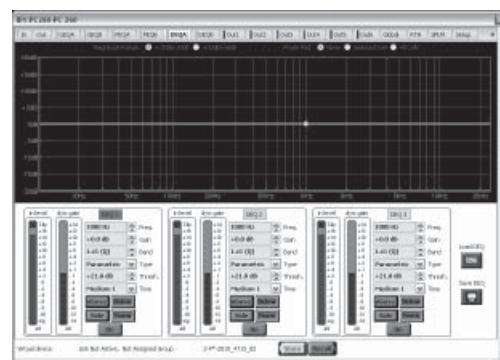
WARNING! The **DELAY difference between MID and HIGH outputs must always be 14.3 mm** (HIGH before MID). If you modify the MID delay to align the tops with the subs, remember always to set the HIGH delay accordingly (-14.3 mm).



GEQ: this is the graphic equalizer on the processor inputs to be used for equalizing the whole system. It can be used for adjusting the system's response or for fixing particular frequency problems in the environment where the system is installed. The AX2010P preset has been prepared in order to obtain the best performance from the system, so we suggest to avoid extreme use of the GEQ.



PEQ: this is a full parametric 5-band equalizer on the processor's inputs. Each filters can be set also as shelving, notch, allpass, high-pass and lo-pass, so this equalizer can be used to optimize the system response according to the environment characteristics, including temperature, humidity and absorption due to the audience.



DEQ: this is 3-band dynamic equalizer useful to optimize the system's response for different kind of applications and different music genres, or to obtain an optimal behaviour of the system at different levels.





Useful tools to set up properly a vertical array system

This is a list of tools that can be very useful to set properly a vertical array system.



CABLE TESTER

It is a good practice to check all cables before each installation, because even one faulty cable can compromise heavily the system performance.



INCLINOMETER WITH LEVER

This tool can be used to verify the vertical array angle. It can be used at the top or at the bottom of the array. In this case you have to sum all splay angles, so the maximum precision is needed for aiming the vertical array, particularly for long throw applications.



LASER DISTANCE METER

This instrument can be useful to measure the height of the vertical array and to know the distance between FOH-Subs and FOH-Array for setting the delay time.



SMAART or similar acoustic measurement system

These are useful to measure delays, phase and response of the system.

LIMITED WARRANTY

Proel warrants all materials, workmanship and proper operation of this product for a period of two years from the original date of purchase. If any defects are found in the materials or workmanship or if the product fails to function properly during the applicable warranty period, the owner should inform about these defects the dealer or the distributor, providing receipt or invoice of date of purchase and defect detailed description. This warranty does not extend to damage resulting from improper installation, misuse, neglect or abuse. Proel S.p.A. will verify damage on returned units, and when the unit has been properly used and warranty is still valid, then the unit will be replaced or repaired. Proel S.p.A. is not responsible for any "direct damage" or "indirect damage" caused by product defectiveness.

- This unit package has been submitted to ISTA 1A integrity tests. We suggest you control the unit conditions immediately after unpacking it.
- If any damage is found, immediately advise the dealer. Keep all unit packaging parts to allow inspection.
- Proel is not responsible for any damage that occurs during shipment.
- Products are sold "delivered ex warehouse" and shipment is at charge and risk of the buyer.
- Possible damages to unit should be immediately notified to forwarder. Each complaint for package tampered with should be done within eight days from product receipt.

SAFETY INSTRUCTIONS

- To reduce the risk, close supervision is necessary when the product is used near children.
- Protect the apparatus from atmospheric agents and keep it away from water, rain and high humidity places.
- This product should be site away from heat sources such as radiators, lamps and any other device that generate heat.
- This product should be located so that its location or position does not interfere with its proper ventilation and heating dissipation.
- Care should be taken so that objects and liquids do not go inside the product.
- The product should be connected to a power supply mains line only of the type described on the operating instructions or as marked on the product. Connect the apparatus to a power supply using only power cord included making always sure it is in good conditions.
- WARNING: The mains plug is used as disconnect device, the disconnect device shall remain readily operable.
- Do not cancel the safety feature assured by means of a polarized line plug (one blade wider than the other) or with a earth connection.
- Make sure that power supply mains line has a proper earth connection.
- Power supply cord should be unplugged from the outlet during strong thunderstorm or when left unused for a long period of time.

CE CONFORMITY

Proel products comply with directive 2004/108/EC (EMC), as stated in EN 55103-1 and EN 55103-2 standards and with directive 2006/95/CE (LVD), as stated in EN 60065 standard.

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